

Claims

I claim:

1. An apparatus for producing a non-linear pattern from a mixture of at least  
5 two extrudants in an extrusion process; the apparatus comprising:

a housing having a first end and a second end and an interior region, the first end adapted to receive the mixture of at least two extrudants and the second end configured to expel the mixture of the at least two extrudants in a non-linear pattern, the second end including a plurality of outlets to selectively expel the mixture;

a shaft having a first end and a second end, the first end located proximate to the first end of the housing and the second end located proximate to the second end of the housing, the shaft being rotatable relative to the housing about an axis;

20 at least one projection coupled to the shaft and rotatable with the shaft, the at least one projection configured to orient the mixture relative to the plurality of outlets in the second end of the housing; and

25 a thrust bearing configured to couple the second end of the shaft to the second end of the housing to permit the expulsion of the mixture in a non-linear pattern as the mixture is oriented relative to the plurality of outlets.

2. The apparatus of claim 1, wherein the thrust bearing comprises a first bearing and a second bearing configured to be pivotable relative to the first bearing.

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3. The apparatus of claim 1, wherein the plurality outlets includes a plurality of first outlets having a first diameter and a plurality of second outlets having a second diameter.
- 5 4. The apparatus of claim 3, wherein the diameter of the plurality of first outlets is 0.5625 inches and the plurality of first outlets are centered on a circle having a radius of 1.125 inches from the axis of the shaft and wherein the diameter of the plurality of second outlets is 0.3125 inches and the plurality of second outlets are centered on a circle having a radius of 1.125 inches from the axis of the shaft.
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5. The apparatus of claim 1, wherein the mixture is oriented such that a first portion of the mixture is expelled through a first outlet of the plurality of outlets at a first instance of time and such that the first portion is not expelled from the first outlet at a second instance of time.
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6. The apparatus of claim 5, wherein the first portion is expelled through the first outlet of the plurality of outlets at a third instance of time, the mixture having made a first complete rotation about the axis in the time elapsed between the first instance of time and the third instance of time.
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7. The apparatus of claim 6, wherein the non-linear pattern is a repeating pattern.
- 25 8. The apparatus of claim 7, wherein the non-linear pattern repeats for every complete revolution of the mixture.
9. An apparatus for producing a multi layer plastic extrudant; the apparatus comprising:

a first extruder configured to extrude a first plastic extrudant;

5            a second extruder configured to extrude a second plastic extrudant,  
the second plastic extrudant being at least partially transparent;

10            a third extruder configured to extrude a third plastic extrudant;

15            a mixer coupled to the second extruder and the third extruder and  
configured to produce a mixture of the second plastic extrudant and the  
third plastic extrudant, the mixture including a non-linear pattern; and

20            a co-extrusion block comprising a first channel and a second  
channel, wherein the first channel is coupled to the first extruder to  
receive the first plastic extrudant to produce a first layer and wherein the  
second channel is coupled to the mixer to receive the mixture of the second  
plastic extrudant and the third plastic extrudant to produce a second  
layer, the second layer containing the non-linear pattern wherein the  
third plastic extrudant of the mixture is visible within the second layer  
due to the second plastic extrudant of the mixture being at least partially  
transparent.

10. The apparatus of 9, wherein the mixer comprises:

25            a housing having a first end and a second end and an interior  
region, the first end configured to receive the second plastic extrudant and  
the third plastic extrudant and the second end configured to expel the  
mixture of the two extrudants through a plurality of outlets;

30            a shaft having a first end and a second end, the first end located  
proximate to the first end of the housing and the second end located

proximate to the second end of the housing, the shaft being rotatable relative to the housing about an axis;

5 at least one projection coupled to the shaft and rotatable with the shaft, the at least one projection configured to orient the mixture of the two extrudants relative to the plurality of outlets in the second end of the housing; and

10 a thrust bearing configured to couple the second end of the shaft to the second end of the housing to permit expulsion of the mixture in a non-linear pattern as the mixture is oriented relative to the plurality of outlets.

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11. The apparatus of claim 10, wherein the thrust bearing comprises a first bearing and a second bearing configured to be pivotable relative to the first bearing.
  12. The apparatus of claim 10, wherein the plurality outlets includes a plurality of first outlets having a first diameter and a plurality of second outlets having a second diameter.
  13. The apparatus of claim 12, wherein the diameter of the plurality of first outlets is 0.5625 inches and the plurality of first outlets are centered on a circle having a radius of 1.125 inches from the axis of the shaft and wherein the diameter of the plurality of second outlets is 0.3125 inches and the plurality of second outlets are centered on a circle having a radius of 1.125 inches from the axis of the shaft.
  14. A plastic sheet, comprising:

a first layer comprising a plastic extrudant; and

5 a second layer coupled to the first layer, the second layer comprising at least two other plastic extrudants, wherein the other plastic extrudants produce a pattern and wherein at least one of the other plastic extrudants is at least partially transparent such that both of the other plastic extrudants are visible in the second layer.

- 10 15. The plastic sheet of claim 14, wherein the at least one of the other plastic extrudants of the second layer has an appearance, the appearance of the at least one of the other plastic extrudants having a first color, and wherein the other plastic extrudant of the at least other two plastic extrudants of the second layer has another appearance, the appearance of the other plastic extrudant of the at least other two plastic extrudants having a second color.
16. The plastic sheet of claim 14, wherein the pattern is a non-linear pattern.
17. The plastic sheet of claim 15, wherein the first and second layers are made 20 of polyethylene and wherein the pattern is a non-linear pattern.
- 25 18. The plastic sheet of claim 17, wherein the second layer is comprised of at least three plastic extrudants and wherein the at least three plastic extrudants produce the non-linear pattern.
19. The plastic sheet of claim 17, wherein the second layer is comprised of at least four plastic extrudants and wherein the at least four plastic extrudants produce the non-linear pattern.

20. The plastic sheet of claim 15, wherein the first and second layers are made of high density polyethylene and wherein the pattern is a non-linear pattern.
- 5      21. The plastic sheet of claim 15, wherein the first and second layers are made of Acrylonitrile Butadiene Styrene and wherein the pattern is a non-linear pattern.
- 10     22. The plastic sheet of claim 15, wherein the first and second layers have a combined thickness in the range of 0.100 inches to 0.350 inches.
- 15     23. The plastic sheet of claim 15, wherein the second layer is made of polystyrene.
- 20     24. A method for producing a plastic sheet, comprising the steps of:  
              extruding a first plastic extrudant to produce a first layer;  
              extruding a second plastic extrudant having an appearance, the appearance being at least partially transparent and including a first color;  
              extruding a third plastic extrudant having another appearance, the other appearance including a second color;  
25        mixing the second plastic extrudant and the third plastic extrudant to produce a mixture, the mixture including a non-linear pattern; and  
              applying the mixture of the second and third plastic extrudant to the first layer to produce a second layer wherein the third plastic

extrudant of the mixture is visible within the second layer due to the appearance of the second plastic extrudant of the mixture.

25. The method of claim 24 wherein the step of mixing the second and third plastic extrudants comprises the steps of:

5 dividing the second plastic extrudant and the third plastic extrudant to produce the mixture;

10 positioning the mixture proximate to a selection member having a plurality of outlets; and

15 selectively expelling the mixture though the plurality of outlets such that a first portion of the mixture is expelled through a first outlet at a first instance of time and such that the first portion is not expelled from the first outlet at a second instance of time.

20. The method of claim 25, wherein the step of selectively expelling the mixture comprises the steps of:

25 rotating at least one of either the selection member or the mixture relative to the other of the selection member or the mixture; and

applying a force to the mixture to expel the first portion through the first outlet at the first time.

27. The method of claim 26, wherein the mixture is rotated relative to the selection member by providing a rotatable shaft positioned adjacent the mixture, the shaft including at least one projection extending from the

shaft, and by engaging the mixture with the projection to cause the rotation of the mixture relative to the selection member.

28. A method for producing a plastic sheet, comprising the steps of:

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extruding a first plastic extrudant having a first appearance, the first appearance being at least partially transparent and including a first color;

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extruding a second plastic extrudant having a second appearance, the second appearance including a second color;

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mixing the first plastic extrudant and the second plastic extrudant to produce a mixture having a non-linear pattern; and

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producing a sheet from the mixture, the second plastic extrudant being visible within the sheet due to the appearance of the first plastic extrudant.

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29. The method of claim 28, wherein the step of mixing the first plastic extrudant and the second plastic extrudant comprises the steps of:

dividing the first plastic extrudant and the second plastic extrudant to produce the mixture;

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positioning the mixture proximate to a selection member having a plurality of outlets; and

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selectively expelling the mixture through the plurality of outlets such that a first portion of the mixture is expelled through a first outlet at

a first instance of time and such that the first portion is not expelled from the first outlet at a second instance of time.

30. The method of claim 29, wherein the step of selectively expelling the mixture comprises the steps of:

5                   rotating at least one of either the selection member or the mixture relative to the other of the selection member or the mixture; and

10                  applying a force to the mixture to expel the first portion through the first outlet at the first time.

- 15                 31. The method of claim 30, wherein the mixture is rotated relative to the selection member by positioning a rotatable shaft adjacent the mixture, the shaft including at least one projection extending from the shaft, and by engaging the mixture with the projection to cause the rotation of the mixture relative to the selection member.

- 20                 32. An apparatus for producing a plastic extrudant; the apparatus comprising:

25                   a first extruder configured to extrude a first plastic extrudant;

                      a second extruder configured to extrude a second plastic extrudant, the second plastic extrudant being at least partially transparent;

25                   a mixer coupled to the first extruder and the second extruder and configured to produce a mixture of the first plastic extrudant and the second plastic extrudant, the mixture including a non-linear pattern; and

a die coupled to the mixer to receive the mixture of the first plastic extrudant and the second plastic extrudant to produce a layer, the layer containing the non-linear pattern wherein the first plastic extrudant of the mixture is visible within the layer due to the second plastic extrudant of the mixture being at least partially transparent.

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33. The apparatus of 32, wherein the mixer comprises:

10 a housing having a first end and a second end and an interior region, the first end configured to receive the first plastic extrudant and the second plastic extrudant and the second end configured to expel the mixture of the two extrudants through a plurality of outlets;

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a shaft having a first end and a second end, the first end located proximate to the first end of the housing and the second end located proximate to the second end of the housing, the shaft being rotatable relative to the housing about an axis;

20 at least one projection coupled to the shaft and rotatable with the shaft, the at least one projection configured to orient the mixture of the two extrudants relative to the plurality of outlets in the second end of the housing; and

25 a thrust bearing configured to couple the second end of the shaft to the second end of the housing to permit expulsion of the mixture in a non-linear pattern as the mixture is oriented relative to the plurality of outlets.

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Express Mail No: EL592237375US
34. The apparatus of claim 33, wherein the thrust bearing comprises a first bearing and a second bearing configured to be pivotable relative to the first bearing.
- 5      35. The apparatus of claim 33, wherein the plurality outlets includes a plurality of first outlets having a first diameter and a plurality of second outlets having a second diameter.
- 10     36. The apparatus of claim 35, wherein the diameter of the plurality of first outlets is 0.5625 inches and the plurality of first outlets are centered on a circle having a radius of 1.125 inches from the axis of the shaft and wherein the diameter of the plurality of second outlets is 0.3125 inches and the plurality of second outlets are centered on a circle having a radius of 1.125 inches from the axis of the shaft.
- 15     37. A plastic sheet, comprising:
- 20                  a first plastic extrudant; and
- 25                  a second plastic extrudant mixed with the first plastic extrudant to produce a pattern, wherein the second plastic extrudants is at least partially transparent such that both the second plastic extrudant and the first plastic extrudant are visible in the sheet.
- 30     38. The plastic sheet of claim 37, wherein the first plastic extrudant has an appearance, the appearance of the first plastic extrudant having a first color, and wherein the second plastic extrudant has another appearance, the appearance of the second plastic extrudant having a second color.
- 35     39. The plastic sheet of claim 37, wherein the pattern is a non-linear pattern.

40. The plastic sheet of claim 38, wherein the first and second plastic extrudants are made of polystyrene and wherein the pattern is a non-linear pattern.
- 5      41. The plastic sheet of claim 38, wherein the sheet is comprised of at least three plastic extrudants and wherein the at least three plastic extrudants produce the non-linear pattern.
- 10     42. The plastic sheet of claim 38, wherein the sheet is comprised of at least four plastic extrudants and wherein the at least four plastic extrudants produce the non-linear pattern.
- 15     43. The plastic sheet of claim 38, wherein the first and second plastic extrudants are made of high density polyethylene and wherein the pattern is a non-linear pattern.
- 20     44. The plastic sheet of claim 38, wherein the first and second extrudants are made of Acrylonitrile Butadiene Styrene and wherein the pattern is a non-linear pattern.
45. The plastic sheet of claim 38, wherein the first and second plastic extrudants are made of polyethylene and wherein the pattern is a non-linear pattern.